



Department of  
Geological Sciences

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The major effort during the reporting period involved the continued evaluation of our existing knowledge of the tectonic history and lithospheric structure of South America. As was expected, most studies have been conducted in the region of the Andes. This is particularly true of lithospheric and crustal structure studies, and our knowledge of the deep structure of the eastern portion of South America is very limited. Thus a surface wave dispersion study of this area has been initiated. Long-period seismograms have been obtained for a tripartite analysis of dispersion. A flow chart of the analyses to be undertaken is shown in Figure 1.

A preliminary geologic/tectonic map has also been prepared and is shown as Figure 2 with accompanying explanation. Efforts to characterize the provinces identified in terms of their geological and geophysical parameters will continue. The only funds expended have been \$2,472.50 (plus overhead and fringe benefits) for the salary of a Research Assistant.

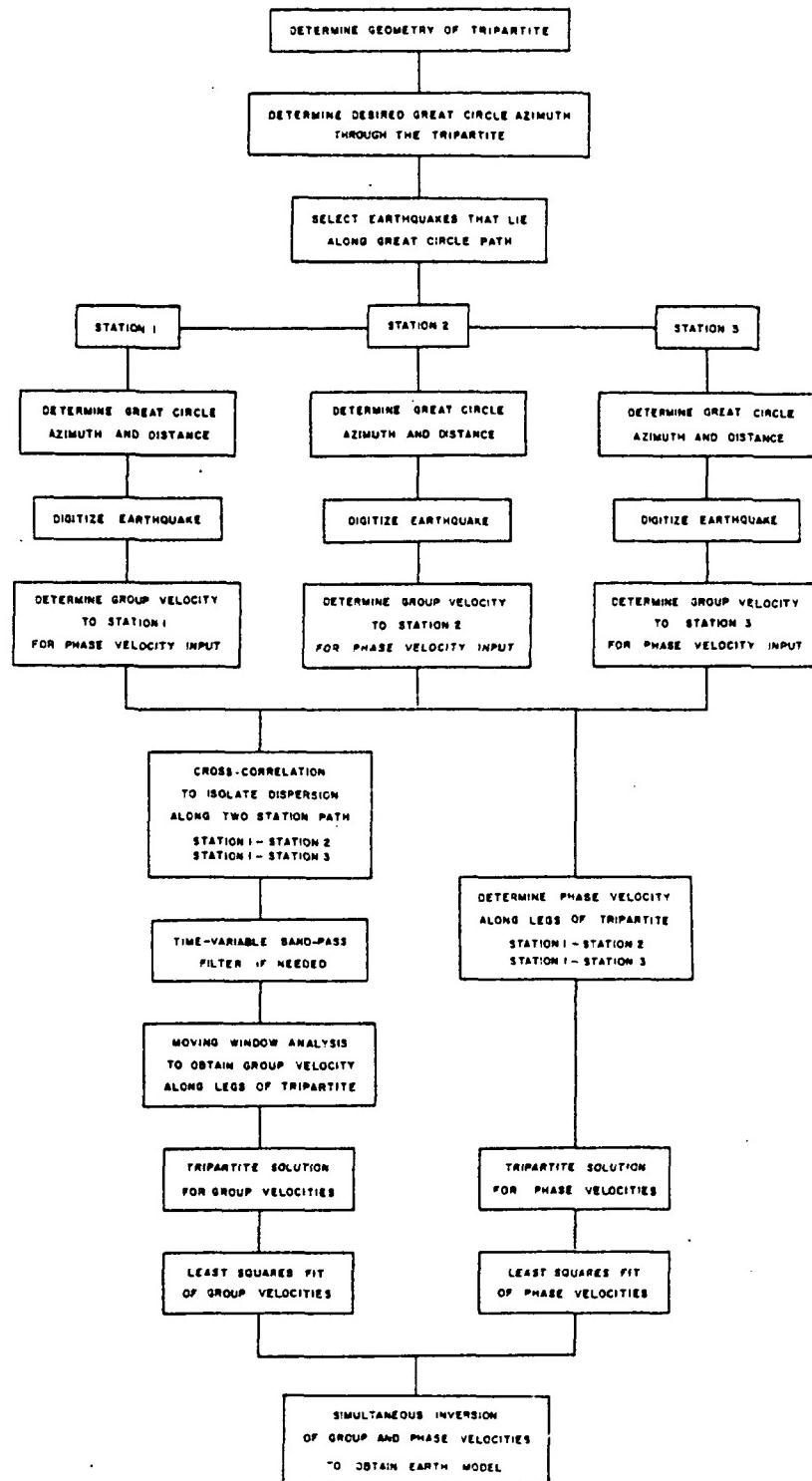


Figure 1



## PRELIMINARY GEOLOGIC/TECTONIC MAP OF SOUTH AMERICA

Figure 2

Explanation of Preliminary Geologic/Tectonic  
Map of South America

March, 1981

1. Puna-Alteplano (intramontane basin; molasse basin):  
Ordovician volcanic sequence; Upper Paleozoic pelite-psammite sequence;  
Pliocene rhyolite; Tertiary and Quaternary deposits.
- 1A. Cordillera Central of Colombia and Ecuador:  
Sierra Nevada de Santa Marta granulite (300-752 m.y.)  
Paleozoic structure; Upper Triassic and Cenozoic volcanism
2. Eastern Cordillera (Cordillera Oriental)  
Ordovician Devonian Flysch trench, eplite-psammite sequence and  
limestone, dolomite. Permian terrigenous and glacial deposits.
- 2A. Cordillera oriental of Colombia:  
Precambrian Santander Massif (680 - 945 m.y.), Paleozoic metamorphic  
and intrusives; Mesozoic miogeosynclinal sediments; partly covering  
of continental Upper Triassic.
3. Sub-Andean zone:  
Jurassic and Cretaceous Oriente sediments with granite and Tertiary  
sediments.
4. Pampean Sierras:  
Late Precambrian; patchy covering of Paleozoic sediments; Pre-Mesozoic  
intrusive; Upper Triassic on Western part; continental Upper Miocene  
and Pliocene in intermountain valleys.
5. Trans-Pampean Sierras:  
Paleozoic eruptives; Triassic and Neogene to Quaternary deposits.
6. Pre-Cordillera:  
Scarce Precambrian; Cambrian to Devonian flysch; Pre-Mesozoic intrusive  
Tertiary to Quarternary volcanic formation (rhyolite).
7. Cordillera Frontal:  
Jurassic sediments; Upper Cretaceous volcanics; Tertiary sediments:  
and Cenozoic volcanics.
8. Cordillera Principal:  
 $8_1$  = Eugeosynclinal Mesozoic-Tertiary belt  
 $8_2$  = Miogeosynclinal
- 8A. Cordillera Occidental of Colombia and Ecuador:  
Jurassic to Cretaceous sediments (siliceous schist), Cretaceous  
intrusives; and Paleogene volcanics (diatase).
9. Cordillera Patagonia:  
Precambrian and Paleozoic metamorphic and volcanics; Cretaceous and  
Eocene volcanics in the north; Mesozoic sediments in the south.

10. Coastal Cordillera:  
Precambrian metamorphics and volcanics; Paleozoic metamorphics; Jurassic intrusive; patchy covering of marine Upper Cretaceous and lower Oligocene along western border.
11. Longitudinal valley fault (Graben Fault) and Pampa del Tramaugal:  
Quaternary sediments.
12. Schist Belt:  
• Precambrian to Mesozoic metamorphics; Cretaceous marine sandstone; Cenozoic volcanics.
13. Bolivian Geosyncline (Coastal Cordillera of Colombia and Ecuador):  
Cretaceous diabase group and eugeosynclinal sediments; Marine Eocene to Middle Miocene.
14. Lower Magdalena (Cesar Depression):  
Marine Upper Triassic and volcanics; Marine Jurassic (?); marine to brackish-water Eocene to Pliocene.
15. Maracaibo Basin:  
Marine Eocene; continental Oligocene to Pliocene
16. Falcon Area:  
Marine Eocene to Miocene; Marine and continental Pliocene
17. Llanos-Ace Plains:  
Continental Upper Triassic (?); Marine Cretaceous and Tertiary thinning down and becoming continental toward Guayana shield.
18. Oriente of Peru:  
Cretaceous; Continental Paleocene; continental Eocene to Miocene.
19. Beni lowland plain:  
Marine and continental Miocene and Pliocene; covered by continental Quaternary sediments.  
Elbol line: It separates the Cordillera Oriental together with the Cordillera Real in the north from the mountainous region of eastern Bolivia in the south. The northern section, according to Ahlfeld (1970) is uplifted compared with the southern section and is presumably offset to the west.
20. Gran Chaco lowland plain (Beni-Choco Pampas plain):  
Scarce continental upper Triassic in the east; Marine and continental Miocene and Pliocene; covered by continental Quaternary.
21. Guayana Shield:  
Precambrian metamorphics and volcanics; covering of continental Upper Triassic and Tertiary in central part; Cenozoic and Quaternary along coast.
22. Central Brazilian shield:  
Precambrian; covering of continental Upper Cretaceous along eastern and Southern borders; Tertiary in central part.

23. Coastal Brazilian shield:  
Precambrian; patchy covering of continental Upper Triassic in the north; Tertiary and Quaternary along coast.
24. Amazon Basin:  
Tertiary and Quaternary deposits.
25. Parnaiba Basin:  
Devonian along east and southeast; Carboniferous in eastern borders; Triassic intrusive in the south; Cretaceous in the central and north part; Marien lower Miocene and Pliocene along coast.
26. San Francisco Basin:  
Lower Silurian; Cretaceous in the central and north.
27. Salitre Basin:  
Scarce Precambrian; Lower Silurian; Devonian; continental Quaternary.
28. Baia-Seijibe Basin:  
Lower Silurian (?); Marine Upper Cretaceous; Marine Paleocene; Continental Pliocene.
29. Panama Basin:  
Scarce Precambrian metamorphics and volcanics (granite, gneiss, and schist). Continental Carboniferous and Permian in the east;
30. Chiquitos Grabea:  
late Precambrian; Lower Silurian; Lower Devonian and Tertiary.
31. Southern hills of Buenos Aires:  
Scarce late Precambrian; Paleozoic; partly covering of continental upper Miocene and Pliocene in the valleys.
32. Northern hills of Buenos Aires:  
Scarce late Precambrian; Marine Pennsylvanian; continental Pliocene in the valleys.
33. Rio Negro Basin:  
Cretaceous in the west; Marine Paleocene; continental Focene to lower Olijocene in the west; Marine Upper Miocene and Pliocene in the east.
34. Chubut Basin:  
Jurassic volcanic, Cretaceous and Paleogene deposits along east coast; Neogene to Quaternary sediments.
35. Santa Cruz Basin:  
Marine and continental Upper Cretaceous; Paleogene in the north and northeast; Neogene and Cenzoic to Quaternary volcanics.
36. Northern Patagonian Massif:  
Late Precambrian; Jurassic volcanics in the north and northeast; Cenozoic baslat in the central to north and south part; Cretaceous in the central part.

37. Southern Patagonian Massif:  
Jurassic volcanics; Cretaceous basalts; continental Eocene
38. Falkland Island:  
Scarce Precambrian; Paleozoic (Lower Devonian; continental Permian) deposits.



Cainozoic graben faults and intra-Andean depressions.